

U.S. EPA Landfill Methane Outreach Program Landfill Gas Analysis Report for Bi-County Landfill

A landfill gas generation curve was developed for the Bi-County Landfill in Clarksville, TN, using several parameters specific to the landfill and defaults from AP-42¹. These data were entered into the EPA LandGEM² software to estimate landfill gas production, beginning with the year after the landfill opened. The values of these model input parameters are provided in Table 1. Landfill-specific data were obtained through phone conversations with landfill personnel. The average annual waste acceptance rate from 2001 until the landfill closes was calculated by the LandGEM software using the waste capacity and closure year of the landfill.

Also necessary for the model to run are the following parameters: L_0 (methane generation potential), k (methane generation rate constant), and the percent volume of methane and carbon dioxide in the landfill gas. Defaults from AP-42 were used for L_0 and k , and LandGEM software defaults were used for the percent methane and carbon dioxide. The AP-42 default value for k for non-arid areas was used because several sources indicated an average annual precipitation of greater than 25 inches for the area surrounding the landfill.

Collection of the landfill gas at its peak flowrate of 373 mmcf in 2010 would be equivalent to any of the following environmental benefits:

Removing 16,000 cars from the road
Planting 22,000 acres of forest
Offsetting the use of 370 railroad cars of coal
Preventing the use of 176,000 barrels of oil

Table 1: Model Input Parameters for the Bi-County Landfill

Model Parameter	Value	Units
Year Landfill Opened	1991	----
Landfill Closure Year	2010	----
Waste Capacity	2,400,000	tons
Waste-In-Place	1,000,000	tons
1991-2000 Annual Waste Acceptance Rate	134,000	tons/yr
2001-2031 Annual Waste Acceptance Rate ^a	95,675	tons/yr
Methane Generation Rate Constant (k)	0.04	1/yr
Methane Generation Potential (L _o)	3,203	ft ³ /ton
Percent Methane in Landfill Gas	50	%
Percent Carbon Dioxide in Landfill Gas	50	%

^a Based on the remaining waste capacity and a closure year of 2010.

The estimated waste-in-place in tons and landfill gas generation in million cubic feet per year (mmcf/yr) for a 50-year period are shown in Table 2. Also provided is the estimated amount of landfill gas recovered over time, which was calculated using the assumption of an 85% collection rate. The graph was created using the landfill gas production and recovery data in Table 2. The curves demonstrate the landfill gas generation and recovery rates over time and the straight, vertical line indicates the current year.

These projections have been prepared specifically for the Bi-County Landfill on behalf of the U.S. EPA Landfill Methane Outreach Program (LMOP), and are based on engineering judgement and represent the standard of care that would be exercised by a professional reasonably experienced in the field of landfill gas projections. LMOP and its contractors ERG and EMCON do not guarantee the quantity of available landfill gas, and no other warranty is expressed or implied. No other party is intended as a beneficiary of this work product, its content, or information embedded therein. Third parties use this information at their own risk. LMOP and its contractors ERG and EMCON assume no responsibility for the accuracy of information obtained from, compiled, or provided by other parties.

References

1. Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources. Chapter 2: Solid Waste Disposal. Section 2.4.4.1. U.S. EPA. November 1998. <http://www.epa.gov/ttn/chief/ap42/ch02/final/c02s04.pdf>
2. Landfill Gas Emissions Model, version 2.01. U.S. EPA. January 6, 1999. <http://www.epa.gov/ttn/catc/products.html>